LUBRICATION

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EDITORIAL

In this issue of LUBRICATION, mention is made of the trouble caused in plants by the installation of a filter system utterly inadequate to take charge of the amount of oil required by the plants in question and at the same time get any results.

In the lubrication of engines, the water which leaks through the stuffing boxes, etc., becomes more or less intimately mixed with the lubricating oil and a sufficient time must be allowed in the settling tanks to permit of the thorough separation.

Oil should not be circulated through the engines at the rate of more than twice in each twenty-four hours to get the best results. In order to do this the capacity of the filter and the requirements of the plant should be figured so that the rate of passage of oil through the system will produce these results.

In figuring out the requirements of the plant, however, it is not sufficient to take the total Horse Power involved, as the lubricating requirements of the different units may vary, without regard to the power supplied by them, as to the number of bearings, etc., which the circulating system must take care of.

Further, the length and arrangement of the piping involved, the pressure available for gravity flow, the conditions under which the oil will be delivered to the bearing and other points in regard to the system must be considered in order to arrive at an accurate estimate of the capacity required in the filtering system.

To blame the oil used—a method which is all too frequently adopted—is an easy and convenient method of shirking responsibility, but one which does not help to remedy the defect. Suitable oil must be used for the purpose, but no grade of oil, however adapted to the needs of circulating system of lubrication, will stand up under conditions which consist of an inadequate and badly arranged system of filters.

The physical requirements of the case demand passage of oil through the system at a sufficiently slow rate to permit a proper separation of the oil and water, and unless this is done, trouble will be experienced until the

matter is remedied from this standpoint. Change of lubricant will be of no avail; the system must be made at least sufficiently large to take care of the power plant requirements, and thorough consideration of this point will save much waste of money, time and material in all cases where filtering systems are required.

LOSSES CAUSED BY INADEQUATE FILTERING SYSTEMS

The proper adaptation of filtering systems to the requirements of power plants is evidently a matter which needs further consideration. Our attention is constantly being called to the use of inadequate filters and the difficulties imposed on the lubricating proposition on that account. Filter capacities are frequently entirely overrated and the systems imperfectly arranged. The instances mentioned show the necessity of thorough investigation of these points.

Early last Spring a well-known company installed a filter system in a power house in which there are three 500 H. P. Cross Compound Engines, two 250 H. P. Cross Compound Engines, two 150 H. P. Reciprocating Type Engines, and one 200 H. P. Air Compressor. All of these are attached to a gravity feed and filtering system which was guaranteed to be large enough to properly handle the station. A first class grade of oil was furnished and two of the 500 H. P. engines were started on the system. After a few days' running the oil was badly emulsified. This was removed and another excellent grade was installed with no better results. The second grade was then removed, the whole system thoroughly cleaned, and a different grade again used. While the latter oil did not emulsify, the water did not separate and consequently the oil failed to give the proper satisfaction. At this point two more engines were added to the system and the fourth grade of oil installed, with the same results as the third grade.

At the time of the first failure an investigation was made by one of our Engineers and the trouble located, the explanation offered to the management regarding all the failures being that the filtering system was entirely too small, improperly constructed and arranged, as the following data will show.

It was found that the holding capacity of the system was 500 gallons, and that a flow of 250 gallons of oil passed through the system each hour. This would mean that 6000 gallons would have to pass through the system each twenty-four hours, and that the whole 500 gallons contained in the system would necessarily have to pass through the complete system and all engines every two hours or twelve times every twenty-four hours. It is evident that at this rate of passage through the filtering system there is no opportunity for the oil to be thoroughly cleansed and freed from water and the natural result is the breaking down of the lubricant. The filters were located about three feet from a large steam trap; the temperature of the oil was found to be from 110° F. to 120° F., and when pumped to the overhead gravity tank the high temperature was maintained owing to the fact that the building had no ventilators. Faults in arrangement were made in the construction of the receiving tank in the basement and the settling tanks at the filter. In the former, the pipe connections to the pump were located at the extreme bottom point of the tank. Even on a larger and otherwise properly equipped system this would be out of order, as this pipe should always be at least eight or ten inches from

the bottom of the tank in order to permit at least some of the water coming from the engine to settle in this tank. The settling tanks were ordinary circular tanks piped to cause the oil to enter to about six inches from the bottom, pass through about eight inches of water, rise to overflow pipe, and out to the filter. These tanks should have been compartment tanks so arranged that the oil would be entirely freed from water before going to the filter. The use of circular tanks with no compartments practically precluded the settlement of the water. These conditions made it absolutely impossible for any oil to give good results as the further records show.

During the time of this trouble the representative of the filter company was on the ground repeatedly and went over the system a number of times, making a few minor changes which showed no beneficial results. He took samples of our different oils, which were examined and pronounced unfit for this class of work. The plant management, being undecided as to who was at fault, placed an order with another company for sufficient engine oil to fill the system. When this was received the whole system was thoroughly cleaned and the competitor's oil installed. This oil was in service a few days when the whole system was stopped up with emulsified oil and the hand feeds on the various engines had to be used. At this juncture the expert for the other company made an examination and claimed that the trouble now lay in the compounded cylinder oils which were being used for cylinder lubrication, a part of which was getting to the system from piston rod packing leaks. Our cylinder oil was then removed and a new lot of engine oil of a different grade put in the system. After a run of forty-eight hours this was emulsified and the hand feeds again resorted to.

By this time the management, the the competitor's expert and the filter representative were fully convinced that the trouble was exactly as claimed by our Engineer at the beginning, and at his suggestion, the filter was removed to the opposite and cooler side of the engine room, and a 1000 gallon four-compartment settling tank was attached to the system and filled with our oil. For a few days we found a small amount of water still remaining in the oil. Upon investigation we found that the cover of the filter was fitted so closely, without ventilation, that there was considerable condensation of the water which dripped back to the oil in the filter. By raising the cover slightly this condensation was overcome and the grade of oil which was formerly declared unsuitable has given excellent results for the past three months with the eight engines connected to this gravity system.

The same company installed a filtering system in another department of their plant where four large vertical blowing engines were in service. This system was installed under a guarantee to take care of six more engines of the same type, which have since been erected and added to the system. During the time the four engines were attached to the filtering system, no complaints were made and the oil was kept in excellent condition but as soon as the six additional engines were added, the oil emulsified and trouble began, and it was found necessary to lubricate the main crank shafts of all the ten engines with new oil, thus cutting out the filtering system on that part of each engine. The filter people were notified, one of their representatives was sent to investigate the trouble, and he reported to his company that the system was being abused by permitting dirt to get into same.

While perfectly satisfied that our oil was in no way responsible for the trouble, and that filtering systems are presumably installed for the purpose of removing dirt and separating water from oils, our Engineer was sent to the plant and instructed to offer his suggestions and definitely locate the trouble. A gallon measure was procured and with the aid of a stop watch it was found that there was one gallon of oil passing from the settling tank to the filter each ten seconds, which means six gallons each minute, 360 gallons each hour, and 8640 gallons each twenty-four hours. The filter representative asserted that from the dimensions of this system it was calculated to take care of 1600 gallons of oil every twenty-four hours. It was immediately evident that a system built to circulate 1600 gallons of oil each twenty-four hours could not operate successfully with the amount (8640 gallons) used, as the rapid circulation made the settlement of water from the oil practically impossible. It was also learned that the method of figuring the capacity of gravity feed systems is based on the total Horse Power of the plant. This does not give accurate results at all, as no allowances are made for the size of the engine room, the height of engines, the number of bearings to be lubricated, nor the flow of oil permitted.

In a number of instances a 250 H. P. engine will have more bearings to lubricate than a 500 H. P. engine; in many places small valves are used to cut down flow, and in some instances it is reduced to drops per minute. All of these and many other conditions are of importance in estimating the size of filtering system necessary to get proper results.

After our Engineer had brought out all the defects in this particular case and shown the impossibility of getting results without enlarging and changing the system, it was admitted by the filter representative to the General Superintendent and Master Mechanic of the plant that the system was too small. A recommendation was made that a new and larger filter and four-compartment settling tanks of at least twice the capacity of those in use should be installed.

CONDITIONS WHERE LUBRICATION HAS BEEN IMPOSSIBLE

Certain classes of bearings around iron and steel mills have been impossible to lubricate, owing to the extreme heat that the bearings are subjected to. It is customary to allow these bearings and axles to wear out, which they do in a few weeks' time, when they are replaced and the expense charged to maintaining equipment. Quite naturally, during all of the years which these plants have been operating, every effort has been made to find a suitable lubricant. That a condition exists where bearings are not lubricated, indicates that nothing has been heretofore suitable for these extreme conditions. It has been left to The Texas Company to fill up the gap, which we have done by making a special lubricating material having a peculiar nature due to the character of our crudes. This oil during the experimental tests has been referred to as "C" Machine Oil, and its action has astonished us, as well as the Steel Mill men who have watched its performance.

The tests of this oil were first made upon what is called continuous rolls on a 10-inch Skelp Mill. These rolls had formerly been lubricated with all sorts of grease mixtures and cylinder stocks without success, and finally a well-known brand of so-called fireproof oil was established, this oil being found to give better

service than any other material. In introducing our oil, the most severe conditions were selected for the test. Alternate rolls were oiled with our oil and closely observed, and as a final test, a cherry red plate was allowed to rest over the bearings of all the rolls, with the result that the bearings lubricated with the fireproof oil caught fire, while the intense heat apparently had no effect upon our lubricant. During the entire test nearly every bearing lubricated with the fireproof oil was afire, and only one bearing caught fire with our oil. The peculiarity was noted that as soon as the plate was removed, the oil in the bearings lubricated with the fireproof oil continued to burn until the oil had disappeared, while in the one case with our oil, the fire went out as soon as the plate was removed, leaving the oil in apparently as good shape as it was before.

Another test was made on a hot metal car at a blast furnace. The car weighed 77,000 pounds with its load; each car was fitted with two axles, the journals being 5½ inches by 10 inches long. The practice was to pack the journals with wool waste and the so-called fireproof oil; the journal was then oiled with ordinary black oil and a mixture of the so-called fireproof oil. After a run of 1½ miles the temperature of the journals averaged 190° F. These journal boxes were re-packed with wool and the new TEXACO "C" Machine Oil, and allowed to run under the same condition for several days; when later examined there was absolutely no frictional heat, the temperature of the journal being the same as the temperature of the atmosphere. For the temperature tests on this oil, the worst journal was selected.

The third extremely severe test was made on the cover to a soaking pit in another Steel Mill. The ingots are heated in the soaking pits from where they were taken to put through the rolls. The cover to the pit weighs about four tons; these covers are seven feet long and nine feet wide and are on four wheels, the journals being $2\frac{7}{16}$ inches by 6 inches. These boxes are made of unmachined cast iron and they run only about four weeks, when they are worn out and replaced. No lubricant has ever been found that would withstand the heat, as when the pits are open, two of the journals get the full force of the heat from the pit. This temperature can be considered to be over 2000° F. The TEXACO "C" Machine Oil was put in these journal boxes and subjected to these severe conditions which no oil has ever been able to withstand. After days of testing, it was found that the new oil would stay on the journals, sticking through all the high temperatures and remaining a lubricant, which will result in a very great money saving to the plant.

There are undoubtedly many manufacturing plants where it is necessary to run cars into kilns or in close proximity to furnaces, where the cost of power, maintenance and repairs is unusually high, owing to the fact that heretofore no lubricant has been found that would successfully stand the very high degree of heat. In such places our discovery will be of the greatest importance, and we are very pleased to have been able to make a material which already has won for itself an entirely new place in the science of lubrication.

A CHANGE IN THE RULE OF LUBRICATION

Nearly all of the lubricating oils in general use are made from Northern and Central Western crudes. These oils are of necessity light in gravity and light in viscosity. In order to produce an engine or machine oil as heavy as 300″ viscosity, it has been found necessary to mix the lighter oils with cylinder stock. In many cases, close observers have reported that an oil so made separates in the oil cups on the engine or machine, as can be readily seen by the difference in the color or the body of the oil at the top and bottom of the glass. It has been noted that the lubricating efficiency of the mixture is very much less than the efficiency produced by the unmixed oil.

The refiners of Northern crudes have had large quantities of light viscosity oils which they have had to market. These light-bodied oils are being used for the greatest proportion of all lubricating work in this country to-day. Naturally, the buyer of oils considers that it is necessary for the needs of his plant to use light-bodied oils, as we can judge from the specifications and requests which are frequently placed before us. There is no question whatever but that certain classes of work, mainly spindles and light machines in textile and other mills, can be operated effectively with oils of a lighter body. Outside of this general class of work, heavier oils than those at present offered are a necessity. This is apparent from the fact that inspections of many large plants where light oils are purchased bring out the interesting point that light oil is invariably mixed with cylinder oil by the operators, the reason being that the oil as purchased has not sufficient body to do the necessary work. Mixing the oil at the plant adds considerably to the total cost of lubrication without the assurance that the results are what they should be.

With our crudes and by our very latest methods we are able to make oils having a viscosity as high as 1000″; these oils are very fine in texture and color; they are made without the mixing of cylinder stocks and contain, therefore, 100 per cent. lubrication. It may be said by the technically inclined, that the use of such heavy-bodied oil will only be accompanied by a large loss of power. From experiments made by Mr. Wm. M. Davis, Lubricating Engineer of Boston, Mass., it was discovered, probably for the first time, that under identical conditions, the frictional heat on a bearing was reduced by using heavy-bodied oil made from Texas crudes as compared to lighter-bodied Pennsylvania oil. Four tests were made, the first series with heavy oil made from Pennsylvania crude compared to a very much heavier straight run Texas oil; the second series being a lighter Pennsylvania straight run oil compared to a considerably heavier straight run Texas oil.

The law governing fluid or oil friction is that the more viscous the lubricant, the greater the friction. When applied to a lubricated bearing, the excess friction can be called frictional loss. A new ruling will undoubtedly have to be made that this general law applies only to frictional loss when comparing oils made from the *same crude*—that when comparing our TEXACO products with oils made from other crudes, the frictional loss will be less with the use of a heavier-bodied TEXACO oil.

Some practical tests, which we have lately made, bear out the experiments made by Mr. Davis. On a high speed wood planer the temperature of the main bearing was reduced 9.8 per cent. and the temperature of the cutting head bearing was reduced 11.2 per cent. The machine was oiled with

a heavy-bodied TEXACO oil for the second test and with a light-bodied well-known oil made from Northern crudes for the first test. 50 per cent. less of the TEXACO oil was used than of the former oil, and while the price per gallon of the TEXACO oil was a trifle higher, the reduction in the amount used, resulted in a total saving of 37.4 per cent. in the cost of lubrication. This record is rather remarkable. In order to obtain reductions in temperatures when working entirely with Northern oils, it is necessary to use lighter-bodied oils to gain the required result, and it is almost impossible to do the work with a less quantity of oil and still have a reduced temperature.

Other experiments along this line are being made, and a technical article will be given in some of the later numbers.

TWO VERY DIFFICULT BEARINGS TO LUBRICATE

In the forge shop of a large plant, complaints were made on account of the lubrication of a Buffalo Blower. This blower was situated directly over an oil burning furnace and the average temperature surrounding it was 110° F. The blower had always given considerable trouble, so to keep it going, the bearings had to be wrapped in waste, saturated with cold water; the shaft and bearings were so worn that the whole blower vibrated to such an extent the oil was shaken out.

When our Engineer visited the plant to show where our oils were to be used, he was taken over to this blower and told its history. To keep the machine running, it was necessary to oil the bearings every fifteen minutes with mixtures of engine oil and cylinder oil and the waste was soaked in cold water at the same time. It required nearly the entire services of one man to keep the blower in operation. In order to get a good basis for a report on the service of the TEXACO oil, our Engineer took readings of the temperature of the bearings. This was very difficult, as the vibration broke several thermometers. As soon as the lubrication was changed to our heavy TEXACO oil, the temperatures were reduced and the next day with the same room temperature, the frictional heat was 24.6 per cent. less on one bearing and 28.3 per cent. less on the other; it was formerly necessary to oil the bearings every fifteen minutes, and since the change to TEXACO oil, the bearings are now being oiled every two hours, making a very decided saving in the labor cost. In fact, it was figured that the saving in labor cost is 66 per cent. No water is necessary, as the bearings are being perfectly lubricated and running at a normal temperature. It formerly took 10.66 pts. of the former oil to do even the inefficient lubrication, and with TEXACO oil the amount used per day is 6 pts., making a reduction of a 43.7 per cent. in quantity with a reduction of 39.2 per cent. in the actual cost outside of the labor cost reduction.

Owing to the exceptionally fine lubricating quality of our heavy TEXACO oils, we were able in this instance to increase the efficiency of the blower and reduce the cost of lubrication and maintainance. It is safe to say that no other oils manufactured would have produced these results. The oils formerly in use were well and favorably known. The engine oil which would ordinarily be supposed to lubricate satisfactorily at this speed, was found to be too light and was mixed with various proportions of cylinder oil until the most satisfactory mixture of 50 per cent. of cylinder oil and 50 per cent. of engine oil was arrived at. It was against this mixture that the above remarkable results were shown.

PRACTICAL TROUBLES REMEDIED

In manufacturing plants, more especially in the larger ones, the development of hot bearings or other troubles of the kind is quite usually blamed on the oil, and in some cases, where it is impossible for the oil company supplying the goods to have an expert on the ground at once, the oil is removed and the business lost. That this method is frequently altogether inaccurate and does not result in remedying the conditions is evidenced by the following incident.

During one of the trips of our inspecting engineer in the Middle West, where he was accompanied by two of our experts who were going over the lubricating work at one of the most important industrial centers in that section of the country, word was received that trouble was being experienced with our oil in one of the large plants.

These experts visited the plant and talked the matter over with the master mechanic, who appeared to be very much disgusted with the condition of affairs and was of the opinion that the oil was unsuitable for the class of work for which we had recommended it. Fortunately the interview took place at the point where the trouble was being experienced, which was on one of the bearings of a large tandem compound engine, and an examination made it very evident to our engineer that the trouble was due to the improper alignment of the engine, the effect of which was to give an improper bearing of the shoe on the guide.

The class of work which this engine was doing varies a great deal in its power requirements, and, as a consequence, the heating of the bearing was particularly observed during the periods when the engine was working under the most severe conditions. The trouble was aggravated by the radiated heat from the high and low pressure piston rods being transmitted to the shoe and by the use of a defective hand feed oil cup.

By permission of the master mechanic our experts were placed in charge of the work and, in conjunction with the mechanical engineer connected with the plant, made a number of curves from the results of the temperature tests with the oil about which the complaint was made, the grade formerly used, and one other grade, and in the course of these tests they succeeded in raising and lowering the temperature very considerably by simply increasing and decreasing the feed of oil. These curves showed distinctly that the oil which we had recommended was thoroughly efficient for the work and proved that, when the mechanical defects were corrected, no difficulty would be experienced.

Thereafter a two days' practical test on this engine was run with the same oil, and finally the oil was placed on a 12,000 H.P. twin type reversing engine. Under both conditions the oil proved to be thoroughly satisfactory and was accepted promptly by the master mechanic.

Sometime ago one of the large steel plants using our lubricant was having considerable trouble from frictional heat in the gear pinions of the finishing rolls on a ten-inch continuous skelp mill.

After an examination of the conditions we recommended a grade of TEXACO Oil as suitable for this purpose. The results, which are given below, show the qualities of TEXACO Oil and afford an additional demonstration that undue frictional heat is not always the result of mechanical defects but is often caused by the use of an improper lubricant.

TEMPERATURES TAKEN NOV. 20TH WITH FORMER OIL

Time	Room Temp.	Pinion Temp.	Frictional Heat
8.00 A.M.	66°F	142°F	76°F
8.30 "	66°F	142°F	76°F
9.00 "	66°F	142°F	76°F
9.30 "	66°F	142°F	76°F
10.00 "	66°F	142°F	76°F
Average	66°F	142°F	76°F

TEMPERATURES TAKEN NOV. 21ST WITH NEW OIL

Time	Room Temp.	Pinion Temp.	Frictional Heat
8.00 A.M.	66°F	116°F	50°F
8.30 "	66°F	116°F	50°F
9.00 "	66°F	116°F	50°F
9.30 "	66°F	116°F	50°F
10.00 "	66°F	116°F	50°F
Average	66°F	116°F	50°F

FRICTIONAL HEAT

Former Oil..... 76°F
New Oil..... 50°F

Reduction in frictional heat, 26°F which equals 34.2%.

A complaint was received a few weeks ago from one of the departments of a plant using our engine oil. Upon investigating the matter our engineer found that the trouble was confined to one particular engine of the reciprocating type.

The complaint made by the engineer in charge was that the oil was too heavy, did not have a sufficient cold test and would not feed properly, especially on cool mornings; that his engine room was exposed to climatic conditions and that change in temperature was the cause of the trouble.

The engine was enclosed in a brick building in good condition, and the temperature had not fallen below 50 degrees in the locality of the plant.

As our oil has a cold test of zero, an investigation was made as to the conditions under which it was used, with the result that the oil cups on the engine were found to be partly filled with emulsified oil and dirt, and an old home-made filter (which was also partly filled with water, emulsified oil and dirt and which had probably not been cleaned for years) was being used for the purpose of filtering.

Just a little attention to the apparatus was all that was necessary to get the best efficiency out of this oil.

Investigation of another complaint regarding a similar grade of oil showed that a barrel of heavy Car Oil (which was not suitable for the class of work for which it was being used and which had not been recommended by us for this use) had been sent over from the storehouse to the foreman in charge.

All barrels containing TEXACO Oils are stenciled very plainly so that there should be no difficulty in the proper distribution of our oils. Inasmuch, however, as a mistake of this kind will frequently cause a great deal of expense and trouble and may involve the plant in a lot of unnecessary repairs, we call attention to the fact here.

AN UNUSUAL CONDITION IN HYDRAULIC PUMP WORK

In a Bessemer plant in one of the large steel mills in Ohio there is an Epping Carpenter hydraulic pump of vertical type 18 x 35 and 8½ x 24, duplex, each piston making eighteen strokes to the minute. The steam pressure of this pump varies from 130 to 150, and the pressure on the low pressure cylinder was about 40 pounds at the time that this investigation was made. Trouble was experienced with this pump and the low pressure cylinder had to be opened.

On examination a black, soft substance was found deposited in the lower end of the low pressure cylinder, the deposit being about three to four inches thick and covering approximately fifty to sixty square inches of surface.

The existence of a deposit of certain dimensions in the low pressure cylinder of this pump showed an alarming condition, which of necessity required immediate investigation. The deposit was carefully removed, the cylinder cleaned, and the pump put into thorough working order. The deposit was preserved and sent by express to our laboratories for examination in order that we might be able to determine the cause of this unusual condition.

There was some tendency on the part of the customer to ascribe the deposit and the unusual difficulties which had been experienced in the working of this pump to the action of TEXACO Lubricating Oils.

Our experience with TEXACO Lubricating Oils and the absence of any such trouble where they are working under innumerable conditions in other plants convinced us that such was not the case. At the same time the actual facts could only be secured on a thorough examination and analysis of the deposit, and our laboratory was requested to go into this matter in every detail so that the cause and character of the deposit would be illuminated.

Upon investigation of the deposit our chemist reported the following unusual character, the important point being that a little over sixty per cent. of this deposit consisted of salts of iron and aluminum, calcium, magnesium and silica, the exact proportions being:

Silica	25.89
Iron and Aluminum Oxide	46.42
Calcium	15.30
Magnesium Oxide	8.63

Practically all the remainder—that is forty per cent.—was composed of mineral and fatty mass soluble in 76 degrees naphtha.

The ash or sediment composed of silica, iron, aluminum etc. was intimately mixed with a certain percentage of the cylinder oil used, the lime and magnesia having acted on the fatty matter in the cylinder oil, producing a certain amount of soapy compound which had bound the whole deposit together into a solid mass.

It became evident from this examination and the condition under which the pump was working that the sediment had been caused by the foaming of the boiler,—the iron, lime, magnesia etc. having come over with the boiling water and been deposited in the bottom of the low pressure cylinder. This sediment on being mixed with the cylinder oil had formed the dark mass having the appearance of tar which we found upon opening the cylinder to investigate the trouble.

The existence of a deposit of the extent and thickness of this one in the cylinders of any engine is a very serious matter and might at any time result in the disabling of the engine

with consequent serious loss and extensive repairs.

It was undoubtedly quite natural that the customer upon first thought lay the blame for this condition upon the cylinder oil. The disclosure of the real cause of the trouble, however, showing as it did that the deposit was the result of the character of the water and the foaming in the boiler, illustrates clearly the importance of having the mechanical arrangements of a plant in excellent condition.

It should be noted also that the lubricating oil in this case, far from being the cause of the trouble, had alleviated what might otherwise have been the scene of a serious accident by converting quite a hard deposit into a comparatively soft, soapy mass.

It is our business

to know lubricating problems. We have examined and remedied so many conditions that we can prescribe one out of our list of

Texaco Lubricants

that will operate most effectually to check friction losses.

All of these oils are of a particularly high quality, obtained only through the utmost care and thoroughness in refining and manufacture. They are prepared so as to give the maximum of economy in lubrication—and their success is easily seen in the saving in lubricating cost and reduction of power waste.

TEXACO LUBRICATING OILS

MANUFACTURED BY

THE TEXAS COMPANY

VALUE vs. PRICE
in Lubrication

THE difference in price or cost per gallon between an ordinary oil and an extra good lubricant is insignificant; yet the difference in results obtained is of great importance. The proper use of good lubricants throughout the plant has a far-reaching effect in the way of increased efficiency and economy, compared to which the cost of the oil appears small.

With these facts in mind we solicit your employment of

Texaco Lubricating Oils

A distinct saving on maintenance charges and fuel accompanies the installation and proper use of Texaco Lubricants in the plant.

These oils have received that additional care and extra regard for quality in their refining that gives them an efficiency that is out of the ordinary.

The severest conditions only serve to bring out their superiority and they are money and "trouble" savers at all times. Texaco Lubricants are economical not because they cost less but because they give more.

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